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Principles of Economics

Money, Banking, and the Central Bank

What is money?

Money is anything that is generally accepted as payment (for products, resources, and settling debt).

What are examples of things that are considered money in the U.S.?

Currency (cash and coin)

Checkable deposits (the aggregate value of checking account balances)

Travelers' Checks

Are ATM cards and Debit Cards Money?

Yes. They draw on checkable deposits, so they are part of that category.

Are Credit Cards Money?

No. One doesn't really pay for an item when one presents a credit card. One takes out a loan, and the credit card issuer pays for the item with money loaned to one.

What are *near monies*?

Near monies are things that can easily be converted into money, such as savings account deposits.

Why does money have value?

Modern money has value because one can use it to buy stuff from virtually anyone in the economy. Contrary to popular belief, there is no gold or other precious metal backing up money, in Fort Knox or anywhere else. (Earlier in U.S. history, money was backed by gold; the government held a certain amount of gold in bank vaults for every dollar that it issued. This was known as a *gold standard*. Today, this isn't true; though the government still has some gold reserves, they do not back up money.)

Why is it a good thing that money exists?

It is much easier to buy and sell things in an economy where there's money than in one where there's no money. Think about a world with no money; if you wanted to buy something, you would have to *barter*—to find someone with something that you want, who is willing to take something from you that has value to her. This is known as a *coincidence of wants*. In contrast, trade is easy in a world with money, since you do not need a coincidence of wants; everyone finds money valuable, so you can trade it for anything that you want from anyone, and you will accept money for anything that you sell.

What is the money supply?

The *money supply* is the amount of money—currency, checkable deposits, and travelers' checks—held by the public, not sitting on reserve in some bank vault. The most popular definition of the money supply is known as M1:

$$M1 = \text{currency in circulation} + \text{checkable deposits} + \text{travelers' checks}$$

Currency in circulation is all currency that is not sitting in a bank vault somewhere.

Are there any other definitions of the money supply?

Yes. M2, for example:

$$M2 = M1 + \text{some near monies}$$

Why should I care about the size of the money supply?

Because I say so. Nah nah nuh nah nah.

Err...actually, the size of the money supply helps determine the level of economic activity in the short run. Consider the extreme of an economy with a zero money supply. All trade would have to be by barter, so there'd be little trade, little economic activity, and a small economy—a small GDP. But if you add money to the economy, people can trade without bartering, and there'd be more economic activity and a larger economy—a larger GDP.

A larger money supply → a larger economy in the short run

A smaller money supply → a smaller economy in the short run

In addition, more money leads to more inflation. Imagine, for example, if money started falling from the sky, so that our nation's money supply skyrocketed. Well, people would grab the money and start going out and trying to buy more stuff. Sellers, seeing all of this new activity, would take advantage of it by raising prices. Higher prices are inflation.

A larger money supply → higher inflation

A smaller money supply → lower inflation

How is the size of the money supply determined?

Well, this is determined in part by the actions of banks and other institutions that accept deposits and make loans, and in part by the actions of the government's Central Bank.

I want to hear more about this process, but first, tell me more about the Central Bank

Every economy has a Central Bank, controlled by government, which does the following things:

- regulates banks and other financial institutions
- lends banks money for short periods of time for various reasons
- conducts **monetary policy**: it attempts to change the size of the money supply to try to affect the economy

The name of the U.S. Central Bank is the *Federal Reserve System*, nicknamed The Fed. It is actually a system of banks located throughout the U.S. with a Board of Governors. The Board of Governors has a Chairperson, who wields much power. Alan Greenspan is the

current Chairman. The Chairman is appointed by the President of the U.S. and confirmed by the Senate.

Okay. Now tell me how banks and the Central Bank affect the size of the money supply

First, here's a very brief, intuitive explanation. (Then we'll do a more complicated explanation.)

Brief explanation: The Central Bank prints currency and releases it to the public. This currency makes its way into and out of banks, as people deposit it and write checks and as banks make loans. The loan-making process expands the money supply above its initial level.

That's a pretty vague explanation. You suck as a teacher.

Be nice, or I will give you an F.

I mean, tell me more about how private banks affect the money supply.

Okay. Here it is in a nutshell: By making loans, banks create money.

More loans → a larger money supply
Fewer loans → a smaller money supply

I will construct a highly simplified version of an economy to illustrate how the loan-making process affects the money supply. I will adhere to the following definition of the money supply (which ignores travelers checks), **M_s**:

$M_s = \text{currency in circulation} + \text{checkable deposits}$

Here's the example, which looks at a fake economy and its money supply over several months:

In January 2000 in a far away economy in a distant galaxy, no money or banks exist.

$M_s \text{ in January 2000} = \text{currency in circulation} + \text{checkable deposits} = 0 + 0 = \mathbf{0}$

In February 2000 the economy's Central Bank prints \$2000 and gives all of it to Kirk. There are still no banks

$M_s \text{ in February 2000} = \text{currency in circulation} + \text{checkable deposits}$
 $= 2000 \text{ (held by Kirk)} + 0 = \mathbf{2000}$

Aha! The Central Bank affects the money supply by controlling the amount of currency that is issued—released to the public

In March 2000 the Bank of Spock opens. Kirk deposits \$1500 into a checking account. For now, the bank keeps all of the 1500 in its vault

$$\begin{aligned} \text{Ms in March 2000} &= \text{currency in circulation} + \text{checkable deposits} \\ &= 500 \text{ (held by Kirk)} + 1500 = \mathbf{2000} \end{aligned}$$

The currency in the bank vault is not circulating, so it's not part of the money supply.

In April 2000 Kirk maintains his checking account (not writing any checks). The Bank of Spock loans \$800 cash to Uhura.

$$\begin{aligned} \text{Ms in April 2000} &= \text{currency in circulation} + \text{checkable deposits} \\ &= 1300 \text{ (held by Kirk and Uhura)} + 1500 = \mathbf{2800} \end{aligned}$$

*Aha! The \$800 loan increased the money supply by \$800! **By making loans, banks create money.***

In May 2000 the Bank of Sulu opens. Uhura deposits her \$800, getting a checking account, and the Bank of Sulu immediately lends \$600 cash to Chekov.

$$\begin{aligned} \text{Ms in May 2000} &= \text{currency in circulation} + \text{checkable deposits} \\ &= 1100 \text{ (held by Kirk and Chekov)} + 2300 = \mathbf{3400} \end{aligned}$$

*Aha! The \$600 loan increased the money supply by \$600! **By making loans, banks create money.***

Can you see how the Central Bank does not have complete control over the money supply, since private banks help determine it? Still, the Central Bank, through three monetary policy tools, tries to affect the money supply by affecting the amount of loans that banks make.

What Are these three monetary policy tools?

- 1) Setting the required reserve ratio
- 2) Setting the discount rate
- 3) Open market operations

Huh?

I will describe these things in detail in a bit. But first, as background, let's look at a simplified balance sheet of a bank.

Do we have to?

Yes. A balance sheet, in general, lists the assets and liabilities of an organization or individual. An *asset* is anything of value owned by the organization; a *liability* is anything that the organization owes to someone or something.

A typical bank has all kinds of assets and liabilities. We shall simplify and consider only 2 types of assets and 1 type of liability:

Assets of a bank:

reserves:

currency sitting in the bank's vault (or held for the bank in some other bank's vault or the Central Bank's vault)

loans:

The value of all of the loans made by the bank. This is an asset to the bank, assuming that the loans will be repaid, because when loans are repaid the bank receives a stream of payments.

Liabilities of a bank:

deposits:

The value of the deposits of a bank's depositors are a liability to the bank, since at any time those depositors can go to the bank and cash out their deposits.

Analysis of the above:

Point A:

Banks take in deposits. They keep some of those deposits on reserve, and lend out the rest. Hence:

$$\text{deposits} = \text{reserves} + \text{loans}$$

Point B:

Why do banks make loans? Because of the interest that they earn on them. Hence there may be a temptation for a bank to loan out most of its deposits. But the only way to make more loans is to reduce the cash that the bank has on reserve. This can be risky; if too many of the bank's customers want to get some cash, then the bank could run out of reserves and fail! Indeed, most bank failures during the Great Depression were due to banks running out of reserves!

Consider this ratio, known as the bank's *reserve ratio*:

$$\text{reserve ratio} = \text{reserves} / \text{deposits}$$

If the bank's reserve ratio falls, then this means that the banking is holding less reserves (because it is instead using the money to make more loans).

Ok, enough about the balance sheet. Tell me about the 3 tools of Monetary Policy

The first one is the required reserve ratio.

The *required reserve ratio* is the legal minimum ratio of reserves to deposits that banks must hold.

When the Central Bank changes the required reserve ratio, the money supply is affected. (Remember, loans affect the money supply; more loans means a bigger money supply, while less loans means a smaller money supply.) Observe:

Fed reduces required reserve ration → money freed up for loans → Ms rises

Fed raises required reserve ratio → banks must keep larger fraction of deposits on reserve → less money available to loan → Ms falls

That's fascinating. What about the second tool of monetary policy—the discount rate?
The *discount rate* is the interest rate that the Central Bank charges a private bank (if the private bank runs low on reserves and must borrow from the Central Bank).

Let me elaborate. Sometimes a bank will have a larger than expected run on its cash reserves during the day, so that at the end of the day it is violating the required reserve ratio. This bank, by law, must increase its reserves. It can do so by borrowing money for a very short amount of time (usually a day or less) from other banks or from the Central Bank. If it borrows money from the Central Bank then it is charged an interest rate known as the discount rate.

Think of the discount rate as the penalty that a bank incurs if it runs out of reserves.

--If the penalty is high, then the bank will do all that it can to avoid it, even if it means holding lots and lots of reserves above the required minimum.

--If the penalty is low, then the bank has no huge fear of running low on reserves, and will hold reserves very close to the required minimum.

So:

If the Fed raises the discount rate, then banks will keep more money on reserve, to try to avoid running low on reserves. This means that they will make fewer loans, and the money supply will shrink: Higher discount rate → smaller Ms

If the Fed lowers the discount rate, then banks will keep less money on reserve, because they have a reduced penalty if they run low on reserves. This means that they will make more loans, and the money supply will increase: Lower discount rate → larger Ms

Wow! I'm so enthralled that I'm sweating like a moose. What about the third monetary policy tool—Open Market Operations?

Open market operations involve buying and/or selling of “used” government securities by the Central Bank.

Say What? What's a government security, and what do you mean by “used?”

This requires a somewhat involved explanation. Ready?

When the U.S. government borrows money, it issues *brand new* government securities to the people and businesses that lend the government money. Think of these securities as I.O.U.s. The government promises to pay the lenders interest for the term of the loan, then at the end of the loan to pay the whole amount of the loan back.

The Treasury department—NOT THE CENTRAL BANK--issues the brand new securities, since it is the branch of government that borrows money. Hence these securities are usually known as Treasury notes, Treasury bills, or Treasury bonds. The term of the loan can range from 30 days to 30 years.

Now, suppose that in October 2000 you agree to lend the Treasury department \$10,000 for 30 years. The Treasury department issues you a brand new government security, agreeing to pay the bearer (you) interest for 30 years, then at the end of 30 years to pay your \$10,000 back.

One year passes. It is October 2001. (You still have your government security, but now it is 1 year old; it is USED.) But now you decide that you don't want to wait another 29 years to get your \$10,000 back; you want some cash now to go to Vegas. What can you do?

You can sell your used government security to someone else. Plenty of people will be willing to buy it, since when you give the government security to them they will receive interest for 29 years, and they will get the \$10,000 at the end of 29 years.

Technically, used government securities are more accurately known as "secondary" government securities.

In the real world, billions of dollars worth of used government securities are bought and sold each day. These securities are bought and sold by people, by businesses, and *by the Federal Reserve System—the Central Bank*. When the Central Bank buys or sells a used government security, it is known as an *open market operation*.

Big Deal. Why Should I Care If the Central Bank Engages in Open Market Operations?

Because they affect the money supply. Observe:

Central Bank buys a government security → the Central Bank prints currency to pay for the security → there is more currency available for loans → the money supply rises

Central bank sells a government security from a member of the public → the member of the public pays with a check → the Central Bank takes cash from the bank that issues the check; then the Central Bank destroys the cash → the bank is able to make fewer loans → the money supply falls.

Wow. This has been a fascinating look at money. What's Next?

In the next set of notes, we'll see how the supply of money interacts with the demand for money to determine short run interest rates.